

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE:  
prof. dr hab. inż. Katarzyna Chojnacka, dr inż. Małgorzata Mironiuk  
**DEPARTMENT: Chemical Department**  
**SCIENTIFIC DISCIPLINE: Chemical Engineering**

**COURSE CARD**

**Course name in Polish:** Paszowe i nawozowe technologie nowej generacji  
**Course name in English:** New generation of feed and fertilizer technologies  
**Course language Polish / English\***  
**University-wide general course type\*: Yes/ No**

- 1) ~~basic course~~
- 2) ~~specialist course~~
- 3) seminar
- 4) ~~humanistic course~~
- 5) ~~language~~

**Subject code: CIQ100104S**

\* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)			15	
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes
Number of ECTS points			0	

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of chemical technology and chemical sciences

**COURSE OBJECTIVES**

- C1 To acquaint PhD students with the mission of chemical and biological sciences in the development of modern sustainable agriculture
- C2 To acquaint the PhD students with the organization of the research and development cycle and its role in implementing process and product innovations in the production of agrochemicals
- C3 To acquaint the PhD students with new civilization challenges related to sustainable development, raw materials and energy problems in the chemical industry
- C4 To acquaint the PhD students with the principles and problems of the development of the innovative fertilizer industry in the EU and Poland
- C5 To acquaint PhD students with the possibilities of financing research and innovation

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND TECHNOLOGY**

programs

<b>Form of classes – seminar (Sem)</b>		<b>Number of hours</b>
Sem1	Introduction - chemical innovations in the development of sustainable agriculture: development of modern plant and breeding economy supported by safe for health and the environment chemical products	1
Sem2	Macro and micronutrients in animal nutrition and field crops, vegetable and fruit growing, problem of phosphorus and nitrogen in the environment, effective use of fertilizer nitrogen / nitrogen use efficiency NUE /	1
Sem3	Mineral and biological raw material resources for the production of fertilizers and feed, new raw material base (renewable raw materials)	1
Sem4	Trends in the production and use of innovative fertilizers in sustainable agriculture (new generation fertilizers, foliar and seed fertilizers, controlled release fertilizers, stimulators and activators, fertilizing chelates)	3
Sem5	Trends in the production and use of innovative feed and feed additives (innovations in feed production, functional food for animals, feed chelates, feed additives, specialized preparations for animals, premixtures, microbiological preparations)	3
Sem6	Supercritical extraction, biosorption and bioaccumulation processes as an effective way of obtaining valuable ingredients for feed and mineral fertilizers	1
Sem7	Didactic trip to selected chemical plants producing fertilizers and / or feed	5
<b>Total hours:</b>		<b>15</b>

<b>TEACHING TOOLS USED</b>
N1. Lecture with multimedia presentation N2. Scientific discussion

<b>ACHIEVED SUBJECT LEARNING OUTCOMES</b>		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	Preparation and delivery of a multimedia presentation, active participation in classes
Skills	P8U_U	
Skills	P8S_UK	
Social competence	P8S_KKK	
Social competence	P8S_KO	

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

- [1] IFA Interational Fertilizer Association , World fertilizer use manual, Rome 2012
- [2] Ch.Hodge, R. Popovici “ Fertilizer production pollution control” M.Dekker , New York
- [3] Interational Fertilizer Association, Glossary of fertilizers terms, IFA,Paris,2013
- [4] European Fertilizer Manufactures Association, Forecast 2012-2022 of food, farming and fertilizer use I European Union, EFMA Brussels,2013
- [5] European Fertilizer Manufactures Assotiation, Fertilizer Production and Technology, EFMA,Brussel,2012
- [6] H.Górecki,Z.Dobrzański, K.Chojacka “Chemia dla rolnictwa” w: Misja nauk chemicznych pr.zb.pod red.B.Marcińca, Poznań, 2012
- [7] K.Chojancka,”Biosorption and bioacumulation” wed. Nova, New York 2010

**SECONDARY LITERATURE:**

- [1] Scientific and technical journals
- [2] Patent Office Bulletin
- [3] Fertilizer Europe.com

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

**prof. dr hab. inż. Katarzyna Chojnacka**  
katarzyna.chojnacka@pwr.edu.pl